

REMARKS

Reconsideration of this application, as amended, is respectfully requested.

Claims 1-5, 7-14 and 30-31 are pending. Claims 1-5, 7-14 and 30-31 stand rejected.

Claims 1, 30 and 31 have been amended. Support for the amendments is found in the specification, the drawings, and in the claims as originally filed. Applicants submit that the amendments do not add new matter.

Rejections Under 35 U.S.C. §102(b)

Claims 1-3, 7 and 30 stand rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. JP 04144130 of Ogawa Kaoru ("Kaoru"). The Examiner stated that

Ogawa Kaoru discloses a plasma chamber (Abstract and Fig. 3), a solid shield plate and a support structure for the shield plate (Fig. 3). Regarding the claim of the shield being stationary, it is and intended use limitation. The shield of Ogawa Kaoru does not have to rotate.

(p. 2, Office Action 6/18/04).

To anticipate a claim, the reference must teach every element of the claim.

"A claim is anticipated only if *each and every element* as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "*The identical invention must be shown in as complete detail as is contained in the ... claim.*" *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

MPEP § 2131 (emphasis added)

Applicants respectfully submit that claim 1 is not anticipated by Kaoru because Kaoru does not disclose at least a support structure having three supports. Amended claim 1 includes the following limitations:

An apparatus comprising:

a plasma chamber to contain a plasma for a plasma-assisted material process upon a substrate;

a solid shielding plate within said plasma chamber disposed between the substrate and a gas inlet of the plasma chamber to actively direct ion flux to desired areas of the substrate; and

a support structure, comprised of three supports and placed within the plasma chamber, to suspend the shielding plate in a stationary position.

(Amended claim 1) (Emphasis added)

Applicants again respectfully submit that the shielding plate of Kaoru does not have three supports. The shielding plate of Kaoru is supported on an axle-like member, parallel to the plane of the wafer, around which the shielding plate rotates. Thus, the support structure in Kaoru has only two supports and cannot have three, distinguishing it from the claimed present invention. Furthermore, the support structure of Kaoru would be inoperable with three supports. Therefore, the claimed invention cannot be inherent in Kaoru.

For at least these reasons, applicants respectfully submit that claim 1 is not anticipated by Kaoru. Given that claims 2, 3, 7, and 8, depend, directly or indirectly, from claim 1, applicants respectfully submit that claims 2, 3, 7, and 8 are, likewise, not anticipated by Kaoru. Further, given that amended claim 30 includes the limitation of a supporting structure having three supports, applicants respectfully submit that claim 30 is not anticipated by Kaoru for at least the reasons discussed above.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-4, 7-11, 13-14 and 30-31 stand rejected under 35 U.S.C. § 103 as being unpatentable over Japanese Patent No. JP 04144130 of Ogawa Kaoru (“Kaoru”) in view of U.S. Patent No. 5,534,751 of Lenz, et al. (“Lenz”) and U.S. Patent No. 5,421,893 of Ilya Perlov (“Perlov”). The Examiner has stated that

Ogawa Kaoru discloses a plasma chamber for etching (Abstract and Fig. 3), a circular (solid) shield plate to control the distribution of ion density on the substrate and a support structure for the shield plate (Fig. 3).

Ogawa Kaoru does not explicitly disclose the thickness of the shield plate and that the plate and supporting structure is made of dielectric material.

Lenz et al disclose a plasma chamber (Fig. 1), a circular shield plate with rounded corner edges (Col 7 line 16) and a support structure for the shield plates (Fig 2 and Col 6 lines 16-26), made of dielectric to confine the plasma (to actively direct ion flux) and a support structure also of dielectric having 6 support members (Fig. 2) and the thickness of the shield plate being 2.4mm (Col 7 line 8). The apparatus disclosed by Lenz et al discloses that the apparatus could be used for etching or CVD.

Therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to have a dielectric shield of thin material so as to control the ion density at the substrate in a predictable way by maintaining insulation of the shield in order to have uniformity of etching. Also, it would be obvious to hold the shield stationary for its simplicity in order to do processes, which do not require the area of the plasma shielded, to be variable.

Omission of an element with a corresponding omission of function is within the level of ordinary skill.

Lenz et al disclose support structure having six supports but do not disclose support structure with three members.

Having six or three support members for a circular object is common and depends upon the mechanical support needed.

Ilya Perlov discloses a common support structure using a spider of three vertical members (Fig 1).

Therefore having a support of three members would have been obvious for one of ordinary skill in the art at the time of invention.

Regarding claim 8, as the shape and dimension of the shield plate determines the ion density distribution it would be obvious to optimize that according to size of substrate, plasma chamber and process requirement.

Regarding claims 10-11, mean free path is a process parameter dependent upon pressure. Obviously, the dimensions of the apparatus depend upon the process parameters and are therefore optimized accordingly as routine.

Regarding claim 31 reticle is a substrate and is an object to be worked on and not a part of the apparatus.

(p. 2-4, Office Action 6/18/04)

However, Applicants respectfully submit, that claim 1 is not obvious under 35 U.S.C.

§103 in view of Kaoru, Lenz, and Perlov.

As discussed above, the claims have the limitation of a “a support structure, comprised of three supports and placed within the plasma chamber”. This limitation is inconsistent with the

teaching of Kaoru, which relies on a two point supporting structure integrated with the plasma chamber to facilitate rotation of the shielding plate about a plane parallel to the reticle (substrate). Because of the intended rotation of Kaoru, Kaoru teaches away from a stationary support structure comprising three supporting members.

Furthermore, the claimed current support structure suspends the shielding plate between the plasma and the reticle to actively direct the incident ion flux. Lenz teaches a mechanism comprising six screws to integrate at least three individual rings into a single assembly not disposed between the plasma and reticle (substrate) but rather between the plasma and the plasma chamber itself. Thus, the Applicants respectfully submit that there is no motivation to combine the teachings of Lenz and Kaoru.

Furthermore, the support of Perlov supports a substrate and works to move the substrate with respect to the plasma chamber. Because the claimed current support suspends the shielding plate, thereby working to dispose the shielding plate between the plasma and the substrate while maintaining the shielding plate in a stationary position with respect to the plasma chamber and substrate, the Applicants submit there is no motivation to combine the teaching of Perlov with the shielding plate of the claimed current invention.

Furthermore, the claimed current invention solves the long-felt, long-existing, but as till now, unsolved problem of actively modifying the ion distribution incident on the reticle (substrate) within a process tool not originally built with a shield plate in a cost effective manner. By using a support structure that is placed within the plasma chamber, the claimed current invention, in the simplicity of the supporting structure, solves this problem by enabling a retrofit of tools already installed in the infrastructure.

Given that claims 2-4 and 7-14 depend, directly or indirectly, from claim 1, applicants submit that claims 2-4 and 7-14 are not obvious under §103 in view of the references cited by the Examiner for at least the reasons stated above.

Claim 30 recites limitations on the support structure similarly to Claim 1. As a result, Applicants submit that Claim 30 is not rendered obvious in view of the references cited by the Examiner for at least the reasons stated above.

Regarding the Examiner's correct observation that the reticle (substrate) is a piece to be worked on rather than a part of the apparatus, Claim 31 has been amended accordingly.

Claim 12 stands rejected under 35 U.S.C. § 103 as being unpatentable over Japanese Patent No. JP 04144130 of Ogawa Kaoru ("Kaoru") in view of U.S. Patent No. 5,534,751 of Lenz, et al. ("Lenz") and U.S. Patent No. 5,421,893 of Ilya Perlov ("Perlov") and further in view of U.S. Patent No. 6,008,130 of Henderson et al ("Henderson"). The Examiner has stated that

Ogawa Kaoru discloses a plasma chamber (Fig. 3), a circular (solid) shield plate and a support structure for the shield plate (Fig. 3).

Ogawa Kaoru or Lenz et al disclose shield plate and a support structure for the shield plates but do not explicitly disclose fully rounded edges.

Henderson et al disclose a plasma chamber (Fig 1), shield plates with rounded corner edges and a support structure for the shield plates (Fig 1-32).

(p. 4, Office Action 6/18/04)

Applicants respectfully submit that claim 12 is not obvious in view of the cited references due to its dependency upon claim 1 for the reasons stated above. Furthermore, Henderson teaches the same integration mechanism as Lenz. Thus, for the reasons stated above, there is no motivation to combine the integration scheme of Henderson with the shielding plate of the claimed current invention, as it would result in a stack of shielding plates disposed between the incident plasma and substrate.

In view of the above amendments and arguments, the Applicants respectfully submit that the applicable rejections and objections have been overcome. If there are any additional charges, please charge Deposit Account No. 02-2666 for any fee deficiency that may be due.

Respectfully,

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Date:

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